

### ABSTRACT

An process of forming multilayer thin film heterostructures is disclosed and includes applying a solution including a first water-soluble polymer from the group of

5 polyanionic species, polycationic species and uncharged polymer species onto a substrate to form a first coating layer on the substrate, drying the first coating layer on the substrate, applying a solution including a second water-soluble polymer from the group of

10 polyanionic species, polycationic species and uncharged polymer species onto the substrate having the first coating layer to form a second coating layer on the first coating layer wherein the second water-soluble polymer is of a different material than the first water-soluble polymer, and drying the second coating layer on the first coating layer so as to form a bilayer structure on the substrate. Optionally, one or more additional applying and drying sequences can be repeated with a water-soluble polymer from the group of polyanionic species, polycationic species and uncharged polymer species, so that a predetermined

15 plurality of layers are built up upon the substrate.